Categorization of damage to concrete bridge decks in Saudi Arabia

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Abstract: A large number of highway bridges have been built in Saudi Arabia during the past two decades. Several of these bridges have shown signs of early deterioration including serious cracking and localized failures. A number of possible causes have been hypothesized as contributing to this problem: poor construction practices, low-quality aggregates, absence of control of vehicular axle loadings, and severe environmental factors. This paper presents an overview of the types of damage identified to be most prevalent in short-span bridges in Saudi Arabia. Based on detailed in situ and laboratory investigations of some 20 girder-slab and slab-type decks, damage to the deck system may be broadly classified into: (1) Structural damage, resulting from overloading of the bridges; and (2) material damage, resulting from lack of quality control and poor construction materials in an environment conducive to corrosion. An additional causal factor contributing to damage in the arid environment is cracking due to stresses due to thermal gradients, especially in thick slab-type decks supported on minimally functional bearings which do not allow free movement at the ends.